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INDEX-CATALOGUE
OF
MEDICAL AND VETERINARY ZOOLOGY

SPECIAL PUBLICATION No. 1

CHECKLIST OF THE INTERNAL AND EXTERNAL PARASITES OF DEER,
ODOCOILEUS HEMIONUS AND *O. VIRGINIANUS*, IN THE
UNITED STATES AND CANADA



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UNITED STATES AND CANADA

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ABSTRACT

The protozoan, helminth, and arthropod parasites of deer, *Odocoileus hemionus* and *O. virginianus*, of the continental United States and Canada are named in a checklist with information categorized by scientific name, deer host, geographic distribution by State or Province, and authority for each record. Sources of information are the files of the Index-Catalogue of Medical and Veterinary Zoology, the National Parasite Collection, and published papers. Three hundred and fifty-two references are cited. Seventy-nine genera of parasites have been reported from North American deer, of which 73 have been assigned one or more specific names representing 137 species (10 protozoans, 6 trematodes, 11 cestodes, 51 nematodes, and 59 arthropods). Sixty-one of these species are also known to occur as parasites of domestic sheep and 54 as parasites of cattle. The 71 parasites that the authors have examined from deer are marked with an asterisk. This paper is designed as a working tool for wildlife and animal disease workers to quickly find references pertinent to a particular parasite species, its deer hosts, and its geographic distribution.

CHECKLIST OF THE INTERNAL AND EXTERNAL PARASITES OF DEER, *ODOCOILEUS HEMIONUS* AND *O. VIRGINIANUS*, IN THE UNITED STATES AND CANADA

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During the course of recent taxonomic investigations and responses to inquiries on the parasites of North American deer, we have encountered unusual difficulties in consulting the voluminous literature concerning, or at least mentioning, deer parasites. Not only are the publications on the subject vast in number, but they are also scattered in an assortment of periodicals, reports, books, and bulletins written by workers of exceptionally diverse backgrounds and interests for widely varying audiences and purposes.

Despite this volume of literature, the speciation, incidence, and geographic distribution of the parasites of North American deer have not yet been adequately documented. As Anderson (1962)¹ pointed out, "... it is not easy for students of these problems, especially those who are not primarily parasitologists, to compare their findings with what is already in the literature." The resultant confusion has costly implications for wildlife management and veterinary parasitology. Hoping to alleviate this situation somewhat by providing a working tool for future investigations, we decided to complete, insofar as possible, our collection of the literature on deer parasites and to make readily available some of the information contained therein.

In light of the aesthetic and economic significance of deer, it is understandable that more, perhaps, has been written about this animal than about any other wild mammal. Important to wildlife workers and sportsmen as the most hunted big game animal in the United States and as a food animal, the deer is significant to farmers as a source both of crop damage and of

parasites and diseases which are transmissible to his domestic animals. Slightly more than 40 percent of the parasites reported from deer are also known to occur as parasites of domestic sheep and slightly less than 40 percent as parasites of cattle.

Because of potential disease relationships to livestock and the consequential role that deer may play in quarantine and regulatory activities, they are animals of interest to veterinarians and veterinary parasitologists. The cattle fever tick, *Boophilus annulatus* (Say, 1821), was described from specimens from a deer; and there are reports attesting that deer infested with *B. microplus* (Canestrini, 1887), another vector of cattle fever, delayed eradication of this dangerous tick from Florida (e.g., Knapp, 1940). Neither species of *Boophilus* now occurs in the United States. Before the advent of the current program to eradicate screw-worms from the United States, Lindquist (1937) suggested that wild animals, including deer, serving as hosts of screw-worms may have been a constant reservoir of infestation for domestic animals. Baker, Longhurst, and Douglas (1957) have done experimental work on the possibility of mutual exchange of gastrointestinal nematodes between domestic sheep and black-tailed deer. The proof that anaplasmosis occurs in wild deer and that it may be transmitted from deer to cattle and vice versa (Boynton and Woods, 1940; Osebold, Christensen, Longhurst, and Rosen, 1959; Howe and Hepworth, 1965; and others) complicates the current thinking on a control program for this disease. The large American liver fluke, *Fascioloides magna* (Bassi, 1875), is well tolerated by deer, whereas in sheep it is highly pathogenic and often causes death (Griffiths, 1962). These are a few examples of the role that deer may play in the transmission of diseases to livestock.

¹Literature Cited, pages 35 to 45, is referred to in the text and in Table 1 by the name of the author (or authors) followed by the date of the publication in parentheses, or by both name and date in parentheses.

Three relatively recent works concerning the literature on North American deer parasites have been published: (1) A bibliography by Halloran (1955) includes references to diseases of all wild mammals and birds on a worldwide basis. (2) Anderson (1962) critically reviews the literature on helminth and arthropod parasites of the white-tailed deer. (3) A partly annotated bibliography edited by Karstad (1964, 1969) covers all diseases of the Cervidae of the world and is available only on microcards. Although each of these compilations is useful, they are not arranged so that references pertinent to a particular parasite species, its deer hosts, and its geographic distribution can be easily and efficiently retrieved. Our intent is to present this information in a concise and easy-to-use checklist categorized by parasite name, host, State or Canadian Province from which the parasite is reported, and authority (Table 1). The protozoan, helminth, and arthropod parasites of both North American species of deer are covered. No information was gathered on blood-sucking diptera that do not spend the larger part of their life on the host (simuliids, tabanids, culicids, etc.).

Our sources for the checklist are the files of the Index-Catalogue of Medical and Veterinary Zoology, the National Parasite Collection, and available published papers. To conserve space, we used a slightly different bibliographic style than that of the Author Catalogue of the Index-Catalogue. Where two or more publications by the same author or set of authors in a single year are cited, the letters following the dates of publication correspond to those in the Author Catalogue. Over 300 publications are cited; we examined at least twice this number. References were not included if: (1) no definite geographic area was given; (2) hosts were not clearly correlated with either localities or parasite species or both (unfortunately, a major contribution with such valuable information as that of Bishopp and Trembley (1945) largely falls into this category); (3) only common names, rather than scientific names, of parasites were used; (4) dangerous assumptions on our part concerning parasite synonymy would have been necessary; (5) the work was not original but consisted of general statements or facts based on previously published records; (6) the nonparasitic stage of certain ectoparasites (*Cephenemyia* spp. and hippoboscids) was discussed without specific reference to the parasitic stage; (7) vague and evasive wording made it impossible to determine whether a parasite was actually being reported or not; or (8) the report concerned only experimental work and, therefore, did not reflect the natural occurrence of a parasite.

Although many of the parasites listed have been reported in the literature under more than

one name, we recorded each parasite species under the scientific name currently accepted for it. To minimize confusion, synonymous names are listed for some species, but to indicate synonymy completely is an undertaking beyond the scope of a checklist. No new synonymy is proposed in this paper. However, a related problem arises in that the generic designation for the meningeal worm of *Odocoileus virginianus* has been in a state of confusion for several years because more than one name has been used by some animal disease workers. Recent findings by Brunetti (1969) on recovery of a little known, similar species will probably result in a definitive, generally acceptable conclusion. Rather than draw possibly unfounded conclusions about synonymy, we either omitted some genera and species of parasites of doubtful occurrence on deer or combinations of questionable nomenclatural validity (e.g., *Linognathus* sp., *Haematopinus crassicornis*) or we listed them exactly as they were reported (e.g., *Cervicola forcicula*, *Damalinia americana*, *Damalinia* sp., *Trichodectes tibialis*, *Trichodectes* sp., *Dermacentor erraticus* typical, *Dermacentor erraticus* var. *albipictus*). Excluding these dubious genera and species, 79 genera of parasites have been reported from North American deer, and 73 of these have been used in combination with one or more specific names to represent 137 species (10 protozoans, 6 trematodes, 11 cestodes, 51 nematodes, and 59 arthropods).

Following the example of Miller and Kellogg (1955), we recognize two species of *Odocoileus* in the United States and Canada—*O. hemionus* (Rafinesque, 1817) and *O. virginianus* (Zimmermann, 1780). In some of the literature cited, the generic names *Cariacus*, *Cervus*, and *Dama* are used for these two species. Publications concerning *O. columbianus*, mule deer, black-tailed deer, coast deer, Columbian black-tailed deer, etc. were considered to be referring to *O. hemionus*. Publications involving white-tailed deer, Virginia deer, or any of the numerous subspecies of *O. virginianus* were referred to that species. Publications mentioning only deer or *Odocoileus* sp. were simply reported under deer with no assumptions about the species.

Information on geographic distribution of the parasites was derived from the published papers that are cited in parentheses following the name of the State or Canadian Province. Numbers from the National Parasite Collection (USNM Helm. Coll. and USDA Par. Coll.) are cited only when they provide records not available in the literature. Some recent Collection records were omitted in deference to depositors who presumably intend to publish their findings in the near future. Dr. K. C. Emerson kindly made available to us records, which are cited like the National Parasite Collection numbers, from his own personal collection and from the U.S. Na-

tional Museum Entomological Collection on the biting lice.

Using material in the National Parasite Collection, we attempted to examine specimens from deer of each of the parasite species reported. Those species marked with an asterisk are those that we have seen. The fact that any species is not marked with an asterisk is not necessarily to be construed as having negative implications regarding its actual occurrence but simply to indicate that we have not personally seen that species. However, we are extremely doubtful about two species of nematodes that were not marked with an asterisk. We question that the *Setaria* of *Cervus elaphus*, incorrectly named *S. cervi* (Rudolphi, 1819), has ever been recovered from North American deer. We have examined 98 specimens of *Setaria* collected from deer in the United States and Canada, including the British Columbia material which Cowan (1946, 1951) reported under this name, and have found them all to be *S. yehi* Desset, 1966. A more complete discussion of the difficulties in speciation and nomenclature of this genus may be found in Becklund and Walker (1969). We

have also examined many specimens collected from deer and identified as *Nematodirus filicollis* (Rudolphi, 1802), and in every case we have re-identified them as *N. odocoilei* Becklund and Walker, 1967. It seems likely that this recently described species has been consistently called by the name of the older, supposedly very common species.

An unusual problem arises in recording some ticks of deer. *Demacentor albipictus* (Packard, 1869) and *D. nigrolineatus* (Packard, 1869) have been reported as separate species (Bishopp and Trembley, 1945) and as one species having two forms (Cooley, 1938), largely differing in that one has an abundance of white on the scutum and the other is without white. We have seen male and female tick specimens (from deer) that could represent both species, as well as specimens with intermediate characters. McIntosh and McDuffie ([1957]) thought that the two species may be separate and may interbreed, giving rise to hybrids with intermediate characters. We have elected to record both species exactly as reported by the various authors and as indicated in the Collection records.

Table 1. Checklist of the Internal and External Parasites of Deer, Odocoileus hemionus and O. virginianus, in the United States and Canada.

PARASITES (* Species seen by authors)	HOSTS				GEOGRAPHIC DISTRIBUTION
	<u>Odocoileus</u>	<u>hemionus</u>	<u>Odocoileus</u>	<u>virginianus</u>	
				Deer	
PROTOZOAN AND PROTOZOAN-LIKE ORGANISMS					
<u>Anaplasma marginale</u>	x				California (Christensen, Osebold, and Rosen, [1959]; Osebold, 1959; Osebold, Christensen, Longhurst, and Rosen, 1959; Osebold, Douglas, and Christensen, 1962; Christensen and McNeal, 1967).
	x				Wyoming (Landram and Honess, 1955; Honess and Winter, 1956; Howe and Hepworth, 1965).
		x			Wyoming (Honess and Winter, 1956).
<u>Anaplasma</u> sp.	x				California (Boynton and Woods, 1933, 1940).
		x			Texas (Kuttler and Robinson, 1967).
			x		California (Hurt et al, [1945]).
<u>Babesia cervi</u> Emerson and Wright, 1968, not (Bettencourt, Franca, and Borges, 1907) Manson, 1907	x				Texas (Emerson and Wright, 1968; Emerson, 1969).
<u>Babesia</u> sp.	x				New Mexico (Spindler, Allen, Diamond, and Lotze, 1958).
	x				Texas (Kuttler and Robinson, 1967).
<u>Eimeria madisonensis</u>	x				Wisconsin (Anderson and Samuel, 1969).
<u>Eimeria mccordocki</u>	x				Wyoming (Landram and Honess, 1955; Honess and Winter, 1956).
		x			Pennsylvania (Anderson and Samuel, 1969).
		x			Texas (Anderson and Samuel, 1969).
		x			Wisconsin (Anderson and Samuel, 1969).
<u>Eimeria odocoilei</u>	x				Washington (Levine, Ivens, and Senger, 1967).
		x			Pennsylvania (Anderson and Samuel, 1969).
		x			Texas (Anderson and Samuel, 1969).
		x			Wisconsin (Anderson and Samuel, 1969).
<u>Eimeria virginianus</u>	x				Pennsylvania (Anderson and Samuel, 1969).
		x			Wisconsin (Anderson and Samuel, 1969).
<u>Eimeria zurnii</u>	x				Wisconsin (Dahlberg and Guettinger, 1956).
<u>Eimeria</u> sp.	x				California (Longhurst and Douglas, 1953).
	x				Wyoming (Landram, 1951b).
		x			Pennsylvania (Samuel and Beaudoin, 1966; Samuel, 1967).
		x			Wisconsin (Samuel and Trainer, 1969).
<u>Eperythrozoon</u> sp.	x				Wyoming (Howe and Hepworth, 1965).
		x			Texas (Kuttler and Robinson, 1967; Kuttler, Robinson, and Rogers, 1967a).

Table 1. Checklist of the Internal and External Parasites of Deer, Odocoileus hemionus and O. virginianus, in the United States and Canada -- Continued

PARASITES	HOSTS				GEOGRAPHIC DISTRIBUTION
	<u>Odocoileus hemionus</u>	<u>Odocoileus virginianus</u>	Deer		
<u>Sarcocystis gracilis</u>	x				California (Taber and Dasmann, 1958).
<u>Sarcocystis</u> sp.	x				California (Sayama, 1952).
	x				Wyoming (Hones and Winter, 1956).
		x			Ontario (Karstad and Trainer, 1969).
		x			Texas (Karstad and Trainer, 1969).
		x			Wisconsin (Karstad and Trainer, 1969).
			x		Wyoming (Rush, [1932]).
<u>Theileria cervi</u>		x			Illinois (Schaeffler, 1963).
<u>Theileria</u> sp.		x			Missouri (Schaeffler, 1961; Krier, Ristic, and Watrach, 1962).
		x			Texas (Cook, Trainer, Glazener, and Nassif, 1965; Glazener and Knowlton, 1967; Kuttler and Robinson, 1967; Kuttler, Robinson, and Bell, 1967; Kuttler, Robinson, and Rogers, 1967a, 1967b; Robinson, Kuttler, Thomas, and Marburger, 1967; Emerson, 1969).
<u>Toxoplasma gondii</u>	x				New Mexico (Trainer, 1962).
			x		Georgia (Walton and Walls, 1964).

Table 1. Checklist of the Internal and External Parasites of Deer, Odocoileus hemionus and O. virginianus, in the United States and Canada -- Continued

PARASITES	HOSTS		GEOGRAPHIC DISTRIBUTION
	<u>Odocoileus hemionus</u>	<u>Odocoileus virginianus</u> Deer	
TREMATODES			
Rumen fluke			
<u>*Paramphistomum liorchis</u>	x		Alabama (USDA Par. Coll. 47560).
	x		Florida (Price and McIntosh, 1944).
	x		Louisiana (Price and McIntosh, 1944).
Blood fluke			
<u>Heterobilharzia americana</u>	x		South Carolina (Byrd, Prestwood, and Maples, 1967).
Liver flukes			
<u>Fasciola hepatica</u>	x		British Columbia (Hadwen, 1916).
	x		California (Longhurst and Douglas, 1953; Taber and Dasmann, 1958; Browning and Lauppe, 1964).
	x		California (Herman, 1945e).
	x		Montana (Butler, 1932).
<u>*Fascioloides magna</u> (<u>Fasciola magna</u>)	x		British Columbia (Hadwen, 1916, 1932; Cowan, 1946, 1951).
	x		Oregon (Dutson, Shaw, and Knapp, 1967).
	x		Washington (Schwartz, [1942]; Dutson, Shaw, and Knapp, 1967).
	x		Alabama (Holland, 1959).
	x		Florida (Dinaburg, 1939; Holland, 1959).
	x		Louisiana (Holland, 1959).
	x		Michigan (Whitlock, 1939).
	x		Minnesota (Fenstermacher, Olsen, and Pomeroy, 1943; Olsen and Fenstermacher, 1943; Griffiths, 1962).
	x		Mississippi (Holland, 1959).
	x		Montana (Aiton, 1938).
	x		New York (Stiles and Hassall, 1894; Cheatum 1951, 1952).
	x		Ontario (Swales, 1935; Kingscote, 1950).
	x		Oregon (Dutson, Shaw, and Knapp, 1967).
	x		South Carolina (Holland, 1959).
	x		Tennessee (Holland, 1959).
	x		Texas (Olsen, 1949; Glazener and Knowlton, 1967).
	x		Wisconsin (Dahlberg and Guettinger, 1956; Samuel and Trainer, 1969).

Table 1. Checklist of the Internal and External Parasites of Deer, Odocoileus hemionus and O. virginianus, In the United States and Canada -- Continued

PARASITES	HOSTS				GEOGRAPHIC DISTRIBUTION
	<u>Odocoileus</u> <u>hemionus</u>	<u>Odocoileus</u> <u>virginianus</u>	Deer		
* <u>Fascioloides magna</u> (Cont.)			x		Florida (Hall, 1912; Schwartz, 1938).
			x		Montana (Senger, 1963).
			x		New York (Levine, 1934; Bump, 1937, 1940, 1941, 1942; Cheatum, 1942).
			x		North Carolina (USDA Par. Coll. 42098).
			x		North Dakota (Dutson, Shaw, and Knapp, 1967).
			x		Wisconsin (Chaddock, 1948).
* <u>Dicrocoelium dendriticum</u>			x		New York (Mapes and Baker, 1950).
Intestinal fluke					
<u>Zygocotyle lunata</u>			x		Michigan (Swanson, 1960).

Table 1. Checklist of the Internal and External Parasites of Deer, Odocoileus hemionus and O. virginianus, in the United States and Canada -- Continued

PARASITES	HOSTS		GEOGRAPHIC DISTRIBUTION
	<u>Odocoileus hemionus</u>	<u>Odocoileus virginianus</u> Deer	

CESTODES

Mature cestodes

<u>Helictometra giardi</u>	x	California (Linsdale and Tomich, 1953; Voge, 1955).
* <u>Moniezia benedeni</u>	x	British Columbia (Cowan, 1946, 1951).
	x	California (Longhurst and Douglas, 1953).
	x	Nebraska (Mohler, Wampole, and Fichter, 1951).
	x	Oregon (USDA Par. Coll. 43182).
	x	South Dakota (Boddicker and Huggins, 1969).
	x	Wyoming (Landram and Honess, 1955; Honess and Winter, 1956).
	x	New York (USDA Par. Coll. 45004).
	x	South Dakota (Boddicker and Huggins, 1969).
	x	Wisconsin (Samuel and Trainer, 1969).
	x	Montana (Senger, 1963).
<u>Moniezia expansa</u>	x	California (Longhurst and Douglas, 1953; Voge, 1955).
	x	Wyoming (Landram, 1951a, 1951b; Landram and Honess, 1955; Honess and Winter, 1956).
	x	Massachusetts (Rankin, 1946).
	x	Pennsylvania (Samuel and Beaudoin, 1966; Samuel, 1967).
	x	Wisconsin (Dahlberg and Guettinger, 1956).
	x	Michigan (Swanson, 1960).
	x	Montana (Senger, 1963).
<u>Moniezia</u> sp.	x	California (Clarke, 1913; Dixon, 1934; Browning and Lauppe, 1964).
	x	Montana (Joneschild, 1938).
	x	Oregon (USDA Par. Coll. 41960).
	x	Florida (USDA Par. Coll. 41319).
	x	North Carolina (Ruff, [1938]; Schilling, 1938).
	x	California (Herman, 1945e).
	x	Idaho (USDA Par. Coll. 33083).
	x	Wyoming (Rush, [1932]).
* <u>Thysanosoma actinioides</u>	x	Arizona (Allen and Erling, 1964).
	x	British Columbia (Cowan, 1946, 1951).
	x	California (Clarke, 1913; Linsdale and Tomich, 1953; Longhurst and Douglas, 1953; Voge, 1955).

Table 1. Checklist of the Internal and External Parasites of Deer, Odocoileus hemionus and O. virginianus, in the United States and Canada -- Continued

PARASITES	HOSTS			GEOGRAPHIC DISTRIBUTION
	<u>Odocoileus hemionus</u>	<u>Odocoileus virginianus</u>	Deer	
* <u>Thysanosoma actinioides</u> (Cont.)	x			Nebraska (Mohler, Wampole, and Fichter, 1951).
	x			Oregon (Shaw, Simms, and Muth, 1934).
	x			South Dakota (Boddicker and Huggins, 1969).
	x			Utah (Grundmann, 1958).
	x			Wyoming (Landram, 1951a, 1951b; Landram and Honess, 1955; Honess and Winter, 1956).
		x		Arizona (USDA Par. Coll. 40463).
		x		South Dakota (Boddicker and Huggins, 1969).
		x		Texas (USDA Par. Coll. 30986).
		x		Wisconsin (Dahlberg and Guettinger, 1956).
			x	California (Herman, 1945e).
			x	Montana (Senger, 1963).
			x	Oregon (Shaw, 1947).
			x	Wyoming (Rush, [1932]).
<u>Thysanosoma</u> sp.	x			California (Taber and Dasmann, 1958).
Immature cestodes				
* <u>Coenurus</u> sp.	x			Idaho (USDA Par. Coll. 49189).
* <u>Cysticercus krabbei</u> (<u>C. tarandi</u> of some authors, <u>Taenia krabbei</u>)	x			Alaska (Klein, 1965).
	x			British Columbia (Cowan, 1951).
	x			Colorado (Williams, 1956; DeGrazio and Pillmore, 1958; Olsen and Williams, 1959).
	x			Oregon (Shaw, Simms, and Muth, 1934).
			x	Montana (Senger, 1963).
			x	Oregon (Shaw, 1947).
<u>Cysticercus lyncis</u> (<u>Taenia lyncis</u>)	x	x		United States (Skinker, 1935).
<u>Cysticercus omis</u> (<u>Taenia omis</u>)	x			Alberta (Holmes and Podesta, 1968).
	x			California (Linsdale and Tomich, 1953).
			x	Montana (Senger, 1963).
<u>Cysticercus ovis</u> (<u>Taenia ovis</u>)	x			British Columbia (Cowan, 1946, 1951).
	x			California (Longhurst and Douglas, 1953).
			x	Wyoming (Rush, [1932]).
* <u>Cysticercus tenuicollis</u> (<u>Taenia hydatigena</u> , <u>Taenia marginata</u>)	x			Alaska (Klein, 1965).

Table 1. Checklist of the Internal and External Parasites of Deer, Odocoileus hemionus and O. virginianus, in the United States and Canada -- Continued

PARASITES	HOSTS			GEOGRAPHIC DISTRIBUTION
	<u>Odocoileus</u> <u>hemionus</u>	<u>Odocoileus</u> <u>virginianus</u>	Deer	
* <u>Cysticercus tenuicollis</u> (Cont.)	x			Alberta (Cowan, 1951; Kerr and Holmes, 1966; Holmes and Podesta, 1968).
	x			Arizona (Hanson and McCulloch, 1955; Russo, 1956; Swank, 1958; Allen and Erling, 1964).
	x			British Columbia (Gregson, 1937; Cowan, 1946, 1951).
	x			California (Rosen, 1951; Linsdale and Tomich, 1953; Longhurst and Douglas, 1953; Browning and Lauppe, 1964).
	x			Montana (Joneschild, 1938, 1939).
	x			New York, Zoo (Blair, 1903).
	x			Oregon (Shaw, Simms, and Muth, 1934).
	x			Pennsylvania, Philadelphia Zoo (Weidman, 1923).
	x			South Dakota (Boddicker and Huggins, 1969).
	x			Utah (Doman and Rasmussen, 1944; Richens, 1967).
	x			Wyoming (Landram and Honess, 1955; Honess and Winter, 1956).
	x			Alberta (Holmes and Podesta, 1968).
	x			British Columbia (Cowan, 1951).
	x			Idaho (USDA Par. Coll. 39879).
	x			Michigan (Whitlock, 1939).
	x			Minnesota (Olsen and Fenstermacher, 1943).
	x			New York (Cheatum, 1952).
	x			Ontario (Anderson, 1962).
	x			Pennsylvania (Samuel and Beaudoin, 1966; Samuel, 1967).
	x			South Dakota (Boddicker and Huggins, 1969).
	x			Wisconsin (Samuel and Trainer, 1969).
	x			Alberta (Sweatman and Plummer, 1957).
	x			British Columbia (Sweatman and Plummer, 1957).
	x			Kansas, Zoo (Gouge, 1936).
	x			Montana (Senger, 1963).
	x			Nevada (USNM Helm. Coll. 38375).
	x			New Mexico (USDA Par. Coll. 28498).
	x			Ontario (Sweatman and Plummer, 1957).
	x			Oregon (Shaw, 1933, 1947).
	x			Quebec (Sweatman and Plummer, 1957).
	x			Wyoming (Rush, [1932]).

Table 1. Checklist of the Internal and External Parasites of Deer, Odocoileus hemionus and O. virginianus, in the United States and Canada -- Continued

PARASITES	HOSTS			GEOGRAPHIC DISTRIBUTION
	<u>Odocoileus</u> <u>hemionus</u>	<u>Odocoileus</u> <u>virginianus</u>	Deer	
* <u>Echinococcus granulosus</u>	x			Alaska (Rausch and Williamson, 1959).
	x			Alberta (Cowan, 1948, 1951).
	x			British Columbia (Cowan, 1946, 1948, 1951).
	x			California (Rosen, 1951).
	x			Oregon (Hall, 1925).
		x		Minnesota (Riley, 1939c, 1939d; Olsen and Fenstermacher, 1943).
		x		Ontario (Sweatman, 1952; Anderson, 1962; Sweatman and Williams, 1963).
		x		Pennsylvania, Philadelphia Zoo (Weidman, 1923).
		x		Quebec (Sweatman and Williams, 1963).
		x		Saskatchewan (Harper, Ruttan, and Benson, 1955; Sweatman and Williams, 1963).
<u>Taenia serialis</u>	x			California (Linsdale and Tomich, 1953).

Table 1. Checklist of the Internal and External Parasites of Deer, Odocoileus hemionus and O. virginianus, in the United States and Canada -- Continued

PARASITES	HOSTS		GEOGRAPHIC DISTRIBUTION
	<u>Odocoileus hemionus</u>	<u>Odocoileus virginianus</u>	
NEMATODES			
Gullet worms			
* <u>Gongylonema pulchrum</u>	x		District of Columbia, Nat. Zool. Pk. (USDA Par. Coll. 4296).
	x		Alabama (USDA Par. Coll. 42871, 47243).
	x		North Carolina (Dikmans and Lucker, 1935; Ruff, [1938]; Schilling, 1938).
	x		Pennsylvania (Samuel and Beaudoin, 1966; Samuel, 1967).
	x		Texas (Emerson, 1969).
	x		Virginia (USDA Par. Coll. 46524, 46880).
	x		? New York (USDA Par. Coll. 49378).
* <u>Gongylonema verrucosum</u>	x		Alabama (USDA Par. Coll. 43621).
	x		Florida (Dikmans and Lucker, 1935; Dinaburg, 1939).
	x		Georgia (USDA Par. Coll. 56614).
	x		Missouri (USDA Par. Coll. 43273).
Stomach worms			
* <u>Haemonchus contortus</u>	x		British Columbia (Cowan, 1951).
	x		California (Longhurst and Douglas, 1953; Taber and Dasmann, 1958; Browning and Lauppe, 1964).
	x		District of Columbia, Nat. Zool. Pk. (USDA Par. Coll. 4282, 4406).
	x		South Dakota (Boddicker and Huggins, 1969).
	x		Wyoming (Landram, 1951a, 1951b; Landram and Honess, 1955; Honess and Winter, 1956).
	x		Florida (Dinaburg, 1939; Hayes, Greer, and Shotts, 1958).
	x		Michigan (Whitlock, 1939).
	x		Pennsylvania (Samuel and Beaudoin, 1966; Samuel, 1967).
	x		South Dakota (Boddicker and Huggins, 1969).
	x		Texas (Robinson, Kuttler, Thomas, and Marburger, 1967; Emerson, 1969).
	x		Wisconsin (Dahlberg and Guettinger, 1956; Samuel and Trainer, 1969).
	x		Georgia (USNM Helm. Coll. 61127).
	x		New York (Levine, 1934).
	x		Texas (Van Volkenberg and Nicholson, 1943).

Table 1. Checklist of the Internal and External Parasites of Deer, Odocoileus hemionus and O. virginianus, in the United States and Canada -- Continued

PARASITES	HOSTS				GEOGRAPHIC DISTRIBUTION
	<u>Odocoileus hemionus</u>	<u>Odocoileus virginianus</u>	Deer		
* <u>Haemonchus similis</u>		x			Florida (Dinaburg, 1939).
<u>Haemonchus</u> sp.			x		Arizona (USDA Par. Coll. 32586).
			x		California (Herman, 1945e).
* <u>Marshallagia marshalli</u> (<u>Ostertagia marshalli</u>)	x				Wyoming (Dikmans, 1932i; Landram, 1951b; Landram and Honess, 1955; Honess and Winter, 1956).
* <u>Obeliscoides cuniculi</u>		x			Arkansas (Maples and Jordan, 1966).
		x			Georgia (Maples and Jordan, 1966).
* <u>Ostertagia bisonis</u> (<u>O. bellae</u> and <u>O. orloffii</u> of some authors. See: Becklund and Walker, 1967b.)	x				Montana (Worley and Sharman, 1966).
	x				South Dakota (Boddicker and Huggins, 1969).
	x				Wyoming (Landram, 1951a; Landram and Honess, 1955; Honess and Winter, 1956).
* <u>Ostertagia circumcincta</u>	x				British Columbia (Cowan, 1946, 1951).
	x				California (Longhurst and Douglas, 1953; Taber and Dasmann, 1958; Browning and Lauppe, 1964).
	x				Oregon (Shaw, Simms, and Muth, 1934).
	x				Wyoming (Landram, 1951a, 1951b; Landram and Honess, 1955; Honess and Winter, 1956).
		x			New York (Dikmans, 1934).
			x		Colorado (USDA Par. Coll. 29276).
			x		Oregon (Shaw, 1947).
* <u>Ostertagia dikmansii</u>	x				Georgia (Becklund and Walker, 1968).
	x				Louisiana (Becklund and Walker, 1968).
	x				Ontario (Becklund and Walker, 1968).
	x				Pennsylvania (Becklund and Walker, 1968).
	x				Wisconsin (Samuel and Trainer, 1969).
* <u>Ostertagia mossi</u>	x				New York (Dikmans, 1934).
	x				Pennsylvania (Dikmans, 1931k; Samuel and Beaudoin, 1966; Samuel, 1967).
	x				Virginia (USDA Par. Coll. 66628).
	x				Wisconsin (Samuel and Trainer, 1969).
			x		Canada (Becklund and Walker, 1967d).
			x		Georgia (Becklund and Walker, 1967d).
			x		Louisiana (Becklund and Walker, 1967d).
			x		New York (Bump, 1937).
* <u>Ostertagia occidentalis</u>	x				Wyoming (Dikmans, 1932i; Landram, 1951b; Landram and Honess, 1955; Honess and Winter, 1956).

Table 1. Checklist of the Internal and External Parasites of Deer, Odocoileus hemionus and O. virginianus, in the United States and Canada -- Continued

PARASITES	HOSTS			GEOGRAPHIC DISTRIBUTION
	<u>Odocoileus</u> <u>hemionus</u>	<u>Odocoileus</u> <u>virginianus</u>	Deer	
<u>*Ostertagia odocoilei</u>				
			x	Alabama (USDA Par. Coll. 47241).
			x	Florida (Dinaburg, 1939).
			x	Louisiana (Dikmans, 1932j).
			x	New York (Dikmans, 1934).
			x	Ontario (USDA Par. Coll. 42884).
			x	Pennsylvania (Dikmans, 1931k; Samuel and Beaudoin, 1966; Samuel, 1967).
			x	South Dakota (Boddicker and Huggins, 1969).
			x	Wisconsin (Samuel and Trainer, 1969).
			x	Georgia (USNM Helm. Coll. 37371, USDA Par. Coll. 56617).
			x	New York (Bump, 1937).
			x	? Texas (USDA Par. Coll. 56956).
			x	Wisconsin (Rausch, 1950).
<u>*Ostertagia ostertagi</u>				
	x			Montana (Worley and Sharman, 1966).
	x			South Dakota (Boddicker and Huggins, 1969).
	x			Wyoming (Landram, 1951a, 1951b; Landram and Honess, 1955; Honess and Winter, 1956).
			x	Wisconsin (Dahlberg and Guettinger, 1956).
			x	New York (USDA Par. Coll. 34050).
			x	Wyoming (Rush, [1932]).
<u>Ostertagia trifurcata</u>				
	x			California (Longhurst and Douglas, 1953; Taber and Dasmann, 1958; Browning and Lauppe, 1964).
	x			Wyoming (Landram, 1951a, 1951b; Landram and Honess, 1955; Honess and Winter, 1956).
<u>Ostertagia sp.</u>				
	x			Wyoming (Landram, 1951b).
			x	Florida (Dinaburg, 1939).
			x	Montana (Worley and Sharman, 1966).
			x	New York (Cheatum, 1952).
			x	South Dakota (Boddicker and Huggins, 1969).
			x	Texas (Glazener and Knowlton, 1967).
			x	California (Herman, 1945e).
			x	Wisconsin (Chaddock, 1948).
<u>*Teladorsagia davtiani</u>			x	Oregon (USDA Par. Coll. 59031, 66571).
<u>*Trichostrongylus axei</u>			x	California (Longhurst and Douglas, 1953; Taber and Dasmann, 1958).

Table 1. Checklist of the Internal and External Parasites of Deer, Odocoileus hemionus and O. virginianus, in the United States and Canada -- Continued

PARASITES	HOSTS				GEOGRAPHIC DISTRIBUTION
	<u>Odocoileus</u> <u>hemionus</u>	<u>Odocoileus</u> <u>virginianus</u>	Deer		
<u>Trichostrongylus axei</u> (Cont.)	x				Montana (USDA Par. Coll. 56785).
		x			Texas (Samuel and Trainer, 1968).
		x			Wisconsin (Samuel and Trainer, 1968, 1969).
Intestinal worms (small intestine)					
* <u>Capillaria</u> sp.	x				British Columbia (Cowan, 1946, 1951).
		x			Florida (Dinaburg, 1939).
		x			Pennsylvania (Samuel and Beaudoin, 1966; Samuel, 1967).
		x			Wisconsin (Samuel and Trainer, 1969).
			x		Georgia (USDA Par. Coll. 56616).
* <u>Cooperia oncophora</u>	x				Arizona (Allen and Erling, 1964).
<u>Cooperia pectinata</u>			x		Texas (Van Volkenberg and Nicholson, 1943).
<u>Cooperia punctata</u>			x		Texas (Van Volkenberg and Nicholson, 1943).
<u>Cooperia surnabada</u> (<u>C. mcmasteri</u>)	x				California (Douglas in Allen and Becklund, 1958).
<u>Cooperia</u> sp.		x			New York (Dikmans, 1934).
			x		Montana (Senger, 1963).
* <u>Monodontus louisianensis</u>		x			Louisiana (Chitwood and Jordan, 1965).
<u>Nematodirella</u> <u>longissimespiculata</u> (<u>N. longispiculata</u> , <u>N. longispiculata</u> <u>antilocaprae</u>)	x				British Columbia (Cowan, 1946, 1951).
* <u>Nematodirella</u> sp.			x		Wyoming (USDA Par. Coll. 31449).
* <u>Nematodirus abnormalis</u>	x				California (USDA Par. Coll. 16503).
		x			Wyoming (Landram, 1951a, 1951b; Landram and Honess, 1955; Honess and Winter, 1956).
<u>Nematodirus filicollis</u> (See text.)	x				British Columbia (Cowan, 1946, 1951).
		x			California (Clarke, 1913; Longhurst and Douglas, 1953; Taber and Dasmann, 1958).
			x		Michigan (Whitlock, 1939).
			x		Pennsylvania (Samuel and Beaudoin, 1966; Samuel, 1967).
			x		Wisconsin (Samuel and Trainer, 1969).
				x	Michigan (Swanson, 1960).
				x	Texas (Van Volkenberg and Nicholson, 1943).
				x	Wyoming (Rush, [1932]).

Table 1. Checklist of the Internal and External Parasites of Deer, Odocoileus hemionus and O. virginianus, in the United States and Canada -- Continued

PARASITES	HOSTS				GEOGRAPHIC DISTRIBUTION
	<u>Odocoileus hemionus</u>	<u>Odocoileus virginianus</u>	Deer		
* <u>Nematodirus odocoilei</u>	x				British Columbia (Becklund and Walker, 1967a).
	x				Montana (Becklund and Walker, 1967a).
	x				Oregon (Becklund and Walker, 1967a).
	x				Wyoming (Becklund and Walker, 1967a).
		x			North Carolina (USDA Par. Coll. 66012).
		x			Quebec (USDA Par. Coll. 66578).
		x			Virginia (USDA Par. Coll. 66627).
* <u>Nematodirus spathiger</u>	x				California (Longhurst and Douglas, 1953; Taber and Dasmann, 1958).
	x				Wyoming (Landram, 1951a, 1951b; Landram and Honess, 1955; Honess and Winter, 1956).
			x		Montana (Senger, 1959).
			x		Texas (Van Volkenberg and Nicholson, 1943).
			x		Wyoming (Rush, [1932]).
<u>Nematodirus</u> sp.	x				California (Browning and Lauppe, 1964).
	x				Wyoming (Landram, 1951b).
		x			New York (USDA Par. Coll. 39946).
		x			Wisconsin (Dahlberg and Guettinger, 1956).
			x		Montana (Senger, 1963).
			x		New York (Bump, 1937).
<u>Strongyloides papillosus</u>	x				California (Longhurst and Douglas, 1953).
<u>Strongyloides</u> sp.		x			Texas (Glazener and Knowlton, 1967).
<u>Trichostrongylus colubriformis</u>	x				California (Longhurst and Douglas, 1953; Taber and Dasmann, 1958).
	x				Wyoming (Landram, 1951a, 1951b; Landram and Honess, 1955; Honess and Winter, 1956).
			x		Texas (Van Volkenberg and Nicholson, 1943).
<u>Trichostrongylus vitrinus</u>	x				California (Longhurst and Douglas, 1953).
<u>Trichostrongylus</u> sp.	x				British Columbia (Cowan, 1946).
	x				California (Browning and Lauppe, 1964).
		x			Texas (Glazener and Knowlton, 1967).
			x		California (Herman, 1945e).
Intestinal worms (large intestine)					
* <u>Chabertia ovina</u>	x				California (Clarke, 1913; Longhurst and Douglas, 1953).

Table 1. Checklist of the Internal and External Parasites of Deer, Odocoileus hemionus and O. virginianus, in the United States and Canada -- Continued

PARASITES	HOSTS				GEOGRAPHIC DISTRIBUTION
	<u>Odocoileus</u> <u>hemionus</u>	<u>Odocoileus</u> <u>virginianus</u>		Deer	
* <u>Chabertia ovina</u> (Cont.)	x				Oregon (Shaw, Simms, and Muth, 1934).
		x			New York (Dikmans, 1934).
			x		Oregon (Shaw, 1947).
* <u>Eucyathostomum longesubulatum</u>	x				Florida (Dinaburg, 1939).
	x				South Carolina (USDA Par. Coll. 65968).
<u>Oesophagostomum cervi</u>	x				Alabama (Payne, Maples, and Smith, 1967).
	x				Louisiana (Payne, Maples, and Smith, 1967).
	x				Maryland (Payne, Maples, and Smith, 1967).
	x				Mississippi (Payne, Maples, and Smith, 1967).
	x				North Carolina (Payne, Maples, and Smith, 1967).
	x				Virginia (Payne, Maples, and Smith, 1967).
	x				West Virginia (Payne, Maples, and Smith, 1967).
<u>Oesophagostomum columbianum</u>	x				Texas (Emerson, 1969).
* <u>Oesophagostomum venulosum</u>	x				Alaska (Klein, 1965).
	x				British Columbia (Cowan, 1946, 1951).
	x				California (Linsdale and Tomich, 1953; Longhurst and Douglas, 1953).
	x				Alabama (Payne, Maples, and Smith, 1967).
	x				Georgia (USNM Helm. Coll. 60572).
	x				Louisiana (Payne, Maples, and Smith, 1967).
	x				Maryland (Payne, Maples, and Smith, 1967).
	x				Michigan (Whitlock, 1939).
	x				Mississippi (Payne, Maples, and Smith, 1967).
	x				North Carolina (Ruff, [1938]; Schilling, 1938; Payne, Maples, and Smith, 1967).
	x				Pennsylvania (Samuel and Beaudoin, 1966; Samuel, 1967).
	x				Virginia (Payne, Maples, and Smith, 1967).
	x				West Virginia (Payne, Maples, and Smith, 1967).
		x			California (Van Roekel, 1929c; Herman, 1945e).
		x			Michigan (Swanson, 1960).
		x			New York (Bump, 1937).
		x			Oregon (Shaw, 1947).
<u>Oesophagostomum</u> sp.	x				Minnesota (Olsen and Fenstermacher, 1943).
	x				Wisconsin (Samuel and Trainer, 1969).

Table 1. Checklist of the Internal and External Parasites of Deer, Odocoileus hemionus and O. virginianus, in the United States and Canada -- Continued

PARASITES	HOSTS				GEOGRAPHIC DISTRIBUTION
	<u>Odocoileus hemionus</u>	<u>Odocoileus virginianus</u>	Deer		
<u>Oesophagostomum</u> sp. (Cont.)			x		New York (Levine, 1934).
* <u>Skrjabinema parva</u>	x				California (Schad, 1959).
	x				Colorado (Olsen and Tolman, 1950; Schad, 1959).
	x				Idaho (Dikmans, 1942; Schad, 1959).
		x			Wisconsin (Samuel and Trainer, 1969).
		x			Colorado (Olsen and Tolman, 1949).
<u>Trichuris ovis</u>	x				British Columbia (Cowan, 1946, 1951).
	x				California (Longhurst and Douglas, 1953).
	x				Oregon (Shaw, Simms, and Muth, 1934).
		x			Pennsylvania (Samuel and Beaudoin, 1966; Samuel, 1967).
		x			Wisconsin (Samuel and Trainer, 1969).
			x		Michigan (Swanson, 1960).
* <u>Trichuris</u> sp.	x				British Columbia (USDA Par. Coll. 43670).
	x				California (Linsdale and Tomich, 1953).
	x				Utah (USDA Par. Coll. 43613).
		x			Florida (Dinaburg, 1939).
		x			Georgia (USDA Par. Coll. 65860).
		x			New York (Cheatum, 1952).
		x			Pennsylvania, Pittsburgh Zoo (USDA Par. Coll. 41995).
			x		California (Herman, 1945e).
<u>Wellcomeia evaginata</u>	x				Colorado (Olsen and Tolman, 1951).
Eyeworm					
* <u>Thelazia californiensis</u>	x				California (Oberhansley, 1940; Stewart, 1940; Herman, 1944; Dixon and Herman, 1945; Linsdale and Tomich, 1953; Longhurst and Douglas, 1953; Taber and Dasmann, 1958; Browning and Lauppe, 1964).
	x				New Mexico (Schad and Raught, 1958).
			x		California (Herman, 1945e; Parmelee, Lee, Wagner, and Burnett, 1956).
			x		Nevada (Parmelee, Lee, Wagner, and Burnett, 1956).

Table 1. Checklist of the Internal and External Parasites of Deer, Odocolleus hemionus and O. virginianus, in the United States and Canada -- Continued

PARASITES	HOSTS		GEOGRAPHIC DISTRIBUTION
	<u>Odocoileus hemionus</u>	<u>Odocoileus virginianus</u> Deer	
Meningeal worm			
* <u>Odocoileostromylus tenuis</u>	x		Alabama (Prestwood and Smith, 1969).
(<u>Pneumostromylus tenuis</u> ,			
<u>Elaphostromylus tenuis</u> ,	x		Arkansas (Prestwood and Smith, 1969).
<u>Neurofilaria cornellensis</u> ,			
<u>Elaphostromylus odocoilei</u>	x		Florida (Prestwood and Smith, 1969).
sensu Anderson, 1956 and			
DeGiusti, 1963)	x		Georgia (Prestwood and Smith, 1969).
	x		Kentucky (Prestwood and Smith, 1969).
	x		Louisiana (Prestwood and Smith, 1969; Seger, Newsom, Roth, and Hutchinson, 1969).
	x		Maine (Behrend and Witter, 1968).
	x		Maryland (Prestwood and Smith, 1969).
	x		Minnesota (Loken, Schlotthauer, Kurtz, and Karns, 1965; Karns, 1966, 1967).
	x		Mississippi (Prestwood and Smith, 1969).
	x		New Brunswick (Smith, Archibald, and Corner, 1964; Smith and Archibald, 1967).
	x		New York (Dougherty, 1945).
	x		North Carolina (Prestwood and Smith, 1969).
	x		Nova Scotia (Smith, Archibald, and Corner, 1964; Smith and Archibald, 1967).
	x		Ontario (Anderson, 1956, 1963, 1965; Bennett and Freeman in Lankester and Anderson, 1968).
	x		Pennsylvania (Whitlock, 1959; Alibasoglu, Kradel, and Dunne, 1961; Samuel and Beaudoin, 1966; Samuel, 1967).
	x		Tennessee (Prestwood and Smith, 1969).
	x		Virginia (Dudak, 1964; Dudak, Cornwell, Holliman, and McGinnes, 1966; Prestwood and Smith, 1969).
	x		West Virginia (Prestwood and Smith, 1969).
	x		Wisconsin (Samuel and Trainer, 1969).
		x	Michigan (DeGiusti, 1963).
Muscle worm (Lungworm)			
<u>Parelaphostromylus odocoilei</u>	x		California (Hobmaier and Hobmaier, 1934; Browning and Lauppe, 1964; Brunetti, 1969).
(<u>Elaphostromylus odocoilei</u>)			

Table 1. Checklist of the Internal and External Parasites of Deer, Odocoileus hemionus and O. virginianus, in the United States and Canada -- Continued

PARASITES	HOSTS		GEOGRAPHIC DISTRIBUTION
	<u>Odocoileus hemionus</u>	<u>Odocoileus virginianus</u>	
		Deer	
Arterial worm			
* <u>Elaeophora schneideri</u>	x		Arizona (Hanson and McCulloch, 1955; Kemper, 1957; Swank, 1958; Hibler and Adcock, 1968).
	x		British Columbia (Cowan, 1946, 1951).
	x		California (Linsdale and Tomich, 1953; Voge, 1956; Taber and Dasmann, 1958).
	x		Colorado (Hibler and Adcock, 1968).
	x		New Mexico (Hibler and Adcock, 1968; Hibler, Adcock, Davis, and Abdelbaki, 1969).
	x		Utah (Wehr and Dikmans, 1935).
	x		Wyoming (Hibler and Adcock, 1968).
		x	Arizona (Hibler and Adcock, 1968).
		x	Florida (USNM Helm. Coll. 59909).
		x	California (Herman, 1945e; Douglas, Cordy, and Spurlock, 1954).
Abdominal worms			
<u>Setaria cervi</u> (See text.)	x		British Columbia (Cowan, 1946, 1951).
	x		California (Longhurst and Douglas, 1953; Taber and Dasmann, 1958; Browning and Lauppe, 1964).
	x		Nebraska (Mohler, Wampole, and Fichter, 1951).
		x	New Jersey (Mangold, 1958).
		x	South Dakota (Boddicker and Huggins, 1969).
		x	California (Herman, 1945e).
* <u>Setaria labiatopapillosa</u>	x		California (Clarke, 1913).
	x		District of Columbia, Nat. Zool. Pk. (Becklund and Walker, 1969).
		x	California (Van Roekel, 1929c, 1929d).
* <u>Setaria yehi</u> (<u>Artionema tundra</u> sensu Yeh, 1959)	x		British Columbia (Becklund and Walker, 1969).
	x		California (Yeh, 1959; Becklund and Walker, 1969).
		x	Alabama (Becklund and Walker, 1969).
		x	Georgia (Yeh, 1959; Becklund and Walker, 1969).
		x	Maryland (Becklund and Walker, 1969).
		x	New Jersey (Yeh, 1959; Becklund and Walker, 1969).
		x	Texas (Becklund and Walker, 1969).

Table 1. Checklist of the Internal and External Parasites of Deer, Odocoileus hemionus and O. virginianus, in the United States and Canada -- Continued

PARASITES	HOSTS				GEOGRAPHIC DISTRIBUTION
	<u>Odocoileus hemionus</u>	<u>Odocoileus virginianus</u>	Deer		
* <u>Setaria yehi</u> (Cont.)			x		Wisconsin (Becklund and Walker, 1969).
<u>Setaria</u> sp.			x		Michigan (Whitlock, 1939).
			x		Minnesota (Olsen and Fenstermacher, 1943).
			x		Ontario (Shoho, 1958; Anderson, 1962).
			x		Pennsylvania (Samuel and Beaudoin, 1966; Samuel, 1967).
			x		Texas (Emerson, 1969).
			x		New York (Bump, 1940).
Lungworms					
* <u>Dictyocaulus filaria</u>		x			California (Clarke, 1913; Longhurst and Douglas, 1953; Browning and Lauppe, 1964).
		x			Michigan (Dikmans, 1935b; O'Roke, 1936a; Whitlock, 1939).
		x			North Carolina (Ruff, [1938]; Schilling, 1938).
			x		British Columbia (Swales, 1933).
			x		New York (Bump, 1937).
* <u>Dictyocaulus viviparus</u> (<u>D. hadweni</u>)		x			Alaska (Klein, 1965).
		x			Alberta (Cowan, 1951).
		x			British Columbia (Cowan, 1946, 1951).
		x			California (Linsdale and Tomich, 1953; Longhurst and Douglas, 1953; Taber and Dasmann, 1958).
		x			Montana (USDA Par. Coll. 47973).
		x			Oregon (Shaw, Simms, and Muth, 1934).
		x			Utah (Doman and Rasmussen, 1944).
		x			Michigan (Dikmans, 1935b; O'Roke, 1936a; Whitlock, 1939; Goble, 1941).
		x			Minnesota (Olsen and Fenstermacher, 1943).
		x			Mississippi (USDA Par. Coll. 65535).
		x			New York (Cheatum, 1951, 1952).
		x			North Carolina (USDA Par. Coll. 65881).
		x			Pennsylvania (Samuel and Beaudoin, 1966; Samuel, 1967).
		x			South Dakota (Boddicker and Huggins, 1969).
		x			Virginia (USDA Par. Coll. 42876, 43609).
		x			Washington (USDA Par. Coll. 43649).
		x			Wisconsin (Dahlberg and Guettinger, 1956; Samuel and Trainer, 1969).

Table 1. Checklist of the Internal and External Parasites of Deer, Odocoileus hemionus and O. virginianus, in the United States and Canada -- Continued

PARASITES	HOSTS				GEOGRAPHIC DISTRIBUTION
	<u>Odocoileus</u> <u>hemionus</u>	<u>Odocoileus</u> <u>virginianus</u>	Deer		
<u>*Dictyocaulus viviparus</u> (Cont.)			x		California (Van Roekel, 1929c).
			x		Georgia (USDA Par. Coll. 56624).
			x		Montana (Senger, 1963).
			x		New York (Bump, 1937, 1942; Cheatum, 1942).
			x		Oregon (Shaw, 1947).
			x		South Carolina (USDA Par. Coll. 65639).
			x		Wisconsin (Flakas, 1950).
<u>Dictyocaulus</u> sp.			x		Florida (Hayes, Greer, and Shotts, 1958).
			x		New York (Cheatum, 1949).
			x		California (Herman, 1945e).
			x		New York (Bump, 1940, 1941).
<u>*Leptostrongylus alpenae</u> (<u>Pneumostrongylus alpenae</u> , <u>Varestrongylus alpenae</u>)			x		Michigan (Dikmans, 1935k; Whitlock, 1939).
			x		New York (Dougherty, 1945; Cheatum, 1949, 1951, 1952).
			x		Michigan (Swanson, 1960).
<u>Pneumostrongylus</u> sp.			x		Michigan (Dikmans, 1935b; O'Roke, 1936a).
<u>*Protostrongylus coburni</u>			x		Michigan (Dikmans, 1935k; O'Roke, 1936a; Whitlock, 1939; Goble, 1941).
			x		New York (Goble, 1943).
			x		New York (Cheatum, 1942).
<u>*Protostrongylus macrotis</u>			x		Colorado (USDA Par. Coll. 43610).
			x		Montana (Dikmans, 19321).
			x		Utah (USDA Par. Coll. 42869, 43679).
			x		Wyoming (Dikmans, 1931j; Landram, 1951a, 1951b; Landram and Honess, 1955; Honess and Winter, 1956).
			x		Colorado (Pillmore, 1961).
			x		Wyoming (Rush, [1932]).
<u>Protostrongylus rufescens</u>			x		Michigan (Whitlock, 1939).
			x		Wisconsin (Dahlberg and Guettinger, 1956).
			x		Michigan (Chandler, 1931; Gardner, [1932?]).
			x		Wisconsin (Flakas, 1950).
<u>Protostrongylus</u> sp.			x		Florida (Hayes, Greer, and Shotts, 1958).
			x		Michigan (Dikmans, 1935b).
			x		New York (Bump, 1940, 1941, 1942).
			x		Wisconsin (Rausch, 1950).

Table 1. Checklist of the Internal and External Parasites of Deer, Odocoileus hemionus and O. virginianus, in the United States and Canada -- Continued

PARASITES	HOSTS		GEOGRAPHIC DISTRIBUTION
	<u>Odocoileus hemionus</u>	<u>Odocoileus virginianus</u> Deer	
Footworm			
<u>Onchocerca</u> sp.	x		Wyoming (Landram and Honess, 1955; Honess and Winter, 1956).
* <u>Wehrdikmansia cervipedis</u> (<u>Onchocerca cervipedis</u> , <u>Onchocerca flexuosa</u> of some authors)	x		Arizona (Hibler, 1965).
	x		British Columbia (Wehr and Dikmans, 1935; Cowan, 1946, 1951).
	x		California (Annereaux, 1941; Duckworth, 1941; Herman and Bischoff, [1946a], 1946b; Herman, 1947; Linsdale and Tomich, 1953; Voge, 1956; Taber and Dasmann, 1958).
	x		Colorado (USDA Par. Coll. 45125, 47222).
	x		Idaho (USDA Par. Coll. 44211).
	x		Ontario (Anderson, 1962).
	x		Oregon (USDA Par. Coll. 41786).
	x		Utah (Yuill, Low, and Fitzgerald, 1961).
	x		Arizona (Hibler, 1965).
	x		Montana (Rush, 1935; Wehr and Dikmans, 1935).
	x		New York (Cheatum, 1952).
	x		Pennsylvania (Latham, 1955; Samuel, 1967).
	x		California (Herman, 1945e).
	x		Colorado (Dikmans, 1933, 1947).
	x		Idaho (DeNio and West, 1942).
	x		Montana (Butler, [1936]; DeNio and West, 1942; Senger, 1959, 1963).
	x		Nevada (USDA Par. Coll. 49496).
	x		Oregon (Shaw, 1947).
	x		Washington (USDA Par. Coll. 42200, 56129).
	x		Wyoming (DeNio and West, 1942).
<u>Wehrdikmansia</u> sp.	x		Colorado (DeGrazio and Pillmore, 1958).
	x		Maine (USNM Helm. Coll. 70955).

Table 1. Checklist of the Internal and External Parasites of Deer, Odocoileus hemionus and O. virginianus, in the United States and Canada -- Continued

PARASITES	HOSTS				GEOGRAPHIC DISTRIBUTION
	<u>Odocoileus hemionus</u>	<u>Odocoileus virginianus</u>	Deer		
ARTHROPODS					
Fleas					
<u>Ctenocephalides canis</u>	x				California (Linsdale and Tomich, 1953; Linsdale and Davis, 1956).
<u>Juxtapulex porcinus</u>		x			Texas (Eads, 1951; Hightower, Lehman, and Eads, 1953).
<u>Orchopeas sexdentatus</u>	x				California (Linsdale and Davis, 1956).
<u>Oropsylla arctomys</u>		x			New York (Stewart, 1933; Geary, 1959).
<u>Pulex irritans</u>	x				British Columbia (Cowan, 1946; Holland, 1949).
	x				California (Augustson, 1943; Holdenreid, Evans, and Longanecker, 1951; Linsdale and Tomich, 1953; Longhurst and Douglas, 1953; Linsdale and Davis, 1956; Taber and Dasmann, 1958; Browning and Lauppe, 1964).
	x				Oregon (Hubbard, 1947; Hopkins and Rothschild, 1953).
			x		California (Clarke, 1913).
			x		Oregon (Jellison and Kohls, 1936).
<u>Pulex simulans</u>		x			United States (Smit, 1958).
Flies					
<u>Cephenemyia apicata</u>	x				Montana (Bennett and Sabrosky, 1962).
		x			? Texas (Glazener and Knowlton, 1967).
			x		California (Bennett and Sabrosky, 1962).
			x		Montana (Bennett and Sabrosky, 1962).
* <u>Cephenemyia jellisoni</u>	x				Alaska (Klein, 1965).
	x				Alberta (Cowan, 1951).
	x				British Columbia (Cowan, 1943, 1946, 1951; Bennett and Sabrosky, 1962).
	x				California (Herman, 1945a; Longhurst and Douglas, 1953; Taber and Dasmann, 1958; Bennett and Sabrosky, 1962).
	x				Colorado (Bennett and Sabrosky, 1962).
	x				Idaho (Bennett and Sabrosky, 1962).
	x				Montana (Townsend, 1941; Capelle and Senger, 1959; Bennett and Sabrosky, 1962).
	x				Utah (Bennett and Sabrosky, 1962; Richens, 1967).
		x			British Columbia (Cowan, 1951).
		x			Minnesota (Bennett and Sabrosky, 1962).
	x			Montana (Bennett and Sabrosky, 1962).	

Table 1. Checklist of the Internal and External Parasites of Deer, Odocoileus hemionus and O. virginianus, In the United States and Canada -- Continued

PARASITES	HOSTS				GEOGRAPHIC DISTRIBUTION
	<u>Odocoileus</u>	<u>hemionus</u>	<u>Odocoileus</u>	<u>virginianus</u>	
				Deer	
<u>Cephenemyia jellisoni</u> (Cont.)	x				?Texas (Glazener and Knowlton, 1967).
	x				Wyoming (Bennett and Sabrosky, 1962).
	x				California (Herman, 1946).
	x				Idaho (Bennett and Sabrosky, 1962).
	x				Montana (Bennett and Sabrosky, 1962; Senger, 1963).
	x				New Mexico (Bennett and Sabrosky, 1962).
	x				Oregon (Bennett and Sabrosky, 1962).
	x				Texas (Bennett and Sabrosky, 1962).
	x				Wyoming (Bennett and Sabrosky, 1962).
<u>*Cephenemyia phobifera</u> (<u>C. phobifer</u>)	x				Georgia (Bennett and Sabrosky, 1962).
	x				Michigan (Whitlock, 1939).
	x				Minnesota (Fenstermacher, Olsen, and Pomeroy, 1943; Olsen and Fenstermacher, 1943; Bennett and Sabrosky, 1962).
	x				New Hampshire (Blickle, 1956).
	x				New Jersey (Mangold, 1958; Bennett and Sabrosky, 1962).
	x				New York (Cheatum, 1951, 1952).
	x				North Carolina (Bennett and Sabrosky, 1962).
	x				North Dakota (Bennett and Sabrosky, 1962).
	x				Ontario (Bennett, 1962; Bennett and Sabrosky, 1962).
	x				Pennsylvania (Latham, 1955).
	x				South Carolina (Bennett and Sabrosky, 1962).
	x				Texas (Bennett and Sabrosky, 1962).
	x				Virginia (Bennett and Sabrosky, 1962).
	x				Wisconsin (Bennett and Sabrosky, 1962).
	x				Michigan (Chandler, 1931; Hutson, 1931; Gardner, [1932?]).
	x				New York (Cheatum, 1942).
	x				Pennsylvania (Stewart, [1930?], 1938).
	x				Texas (Van Volkenberg and Nicholson, 1943).
	x				West Virginia (USDA Par. Coll. 56984).
<u>*Cephenemyia prattl</u>	x				California (Dixon, 1934; McLean, 1940; Linsdale and Tomich, 1953).
	x				Colorado (USDA Par. Coll. 43440).
	x				Montana (Jellison, 1935; Joneschild, 1938).
	x				Nebraska (Mohler, Wampole, and Fichter, 1951).

Table 1. Checklist of the Internal and External Parasites of Deer, Odocoileus hemionus and O. virginianus, in the United States and Canada -- Continued

PARASITES	HOSTS			GEOGRAPHIC DISTRIBUTION
	<u>Odocoileus</u> <u>hemionus</u>	<u>Odocoileus</u> <u>virginianus</u>	Deer	
<u>*Cephenemyia pratti</u>	x			Utah (Doman and Rasmussen, 1944).
		x		Texas (Hunter, 1915; Bennett and Sabrosky, 1962).
			x	Arizona (USDA Par. Coll. 29421, 57042).
			x	British Columbia (Bruce, 1931).
			x	California (Hunter, 1915; Herman, 1946).
			x	Colorado (Bennett and Sabrosky, 1962).
			x	Georgia (USDA Par. Coll. 17321).
			x	Idaho (USDA Par. Coll. 29422).
			x	New Mexico (USDA Par. Coll. 42921, 45849).
			x	Oregon (USDA Par. Coll. 28126).
			x	Utah (Knowlton and Smith, 1936; Bennett and Sabrosky, 1962).
			x	Wyoming (USDA Par. Coll. 29394).
<u>Cephenemyia trompe</u>		x		Ontario (Bennett and Sabrosky, 1962).
		x		Wisconsin (Dahlberg and Guettinger, 1956).
<u>Cephenemyia sp.</u>	x			Arizona (Swank, 1958).
	x			California (Browning and Lauppe, 1964).
	x			Colorado (Walker, 1929).
	x			Oregon (Shaw, Simms, and Muth, 1934).
	x			Wyoming (Hones and Winter, 1956).
		x		Minnesota (Fitch, 1928).
		x		Ontario (Scholten, Ronald, and McLean, 1962).
		x		Pennsylvania (Samuel, 1967).
		x		Wisconsin (Samuel and Trainer, 1969).
			x	British Columbia (Bruce, 1931).
			x	California (Clarke, 1913; Van Roekel, 1929c).
			x	New York (Bump, 1937, 1940, 1941, 1942).
			x	Oregon (Shaw, 1947; Greene, 1956).
			x	Pennsylvania (Stewart, 1929).
			x	Wisconsin (Chaddock, 1948).
			x	Wyoming (Rush, [1932]).

Table 1. Checklist of the Internal and External Parasites of Deer, Odocoileus hemionus and O. virginianus, in the United States and Canada -- Continued

PARASITES	HOSTS			GEOGRAPHIC DISTRIBUTION
	<u>Odocoileus</u> <u>hemionus</u>	<u>Odocoileus</u> <u>virginianus</u>	Deer	
<u>Cochliomyia hominivorax</u> (<u>Cochliomyia americana</u> , <u>Callitroga americana</u> , <u>Callitroga hominivorax</u>)		x		Texas (Lindquist, 1937; Glazener and Knowlton, 1967).
			x	Alabama (Allen, G. W., 1951; Allen, R. H., 1951).
			x	Arizona (Nichol, 1938).
			x	Arkansas (Allen, G. W., 1951).
			x	Florida (Allen, G. W., 1951; Strode, 1955).
			x	Georgia (Allen, G. W., 1951).
			x	Louisiana (Allen, G. W., 1951).
			x	Mississippi (Allen, G. W., 1951).
			x	North Carolina (Allen, G. W., 1951).
			x	South Carolina (Allen, G. W., 1951).
			x	Tennessee (Allen, G. W., 1951).
<u>Cochliomyia macellaria</u>			x	Arizona (Nichol, 1938).
			x	Florida (Insect Pest Survey Bull., [1934]).
			x	Georgia (Insect Pest Survey Bull., [1934]).
<u>Cuterebra</u> sp.	x			California (Longhurst and Douglas, 1953).
			x	New York (Severinghaus, 1949).
<u>Lipoptena cervi</u> (<u>L. subulata</u> Coquillett)			x	Massachusetts (Bequaert, 1935, 1937, 1942).
			x	New Hampshire (Bequaert, 1935, 1937, 1942, 1957).
			x	New York (Gerberg and Goble, 1941; Bequaert, 1942, 1957).
			x	Pennsylvania (Bequaert, 1935, 1937, 1942).
			x	New Hampshire (Coquillett, 1907; Bequaert, 1937, 1942).
			x	New York (Bump, 1941; Bequaert, 1957).
* <u>Lipoptena depressa</u>	x			British Columbia (Bruce, 1931; Bequaert, 1935, 1937; Spencer, 1938, 1939; Bequaert, 1942; Cowan, 1943, 1946, 1951; Bequaert, 1957).
			x	California (Ferris and Cole, 1922; Dixon, 1934; Bequaert, 1935, 1937, 1942; Holdenreid, Evans, and Longanecker, 1951; Linsdale and Tomich, 1953; Longhurst and Douglas, 1953; Bequaert, 1957; Taber and Dasmann, 1958; Browning and Lauppe, 1964).
			x	Montana (Bequaert, 1935, 1937, 1942, 1957; Senger and Capelle, 1959).
			x	Oregon (Shaw, Simms, and Muth, 1934; Bequaert, 1935, 1937, 1942, 1957).
			x	South Dakota (Bequaert, 1935, 1957).
			x	Washington (Bequaert, 1935, 1937, 1942, 1957).
			x	Wyoming (Bequaert, 1957).

Table 1. Checklist of the Internal and External Parasites of Deer, Odocoileus hemionus and O. virginianus, In the United States and Canada -- Continued

PARASITES	HOSTS			GEOGRAPHIC DISTRIBUTION
	<u>Odocoileus</u> <u>hemionus</u>	<u>Odocoileus</u> <u>virginianus</u>	Deer	
* <u>Lipoptena depressa</u> (Cont.)	x			British Columbia (Cowan, 1951; Bequaert, 1957).
	x			Idaho (Bequaert, 1942, 1957).
	x			Montana (Bequaert, 1957; Senger and Capelle, 1959).
	x			South Dakota (Bequaert, 1957).
	x			Washington (Bequaert, 1957).
		x		British Columbia (Ferris and Cole, 1922).
		x		California (Clarke, 1913, Bequaert, 1937; Herman, 1945d).
		x		Michigan (O'Roke, 1936b).
		x		Montana (Senger, 1963).
		x		Oregon (Bequaert, 1937; Shaw, 1947).
* <u>Lipoptena mazamae</u>	x			Florida (Bequaert, 1935, 1937, 1942, 1957).
	x			Georgia (Bequaert, 1935, 1957).
	x			Louisiana (Bequaert, 1957).
	x			South Carolina (Bequaert, 1935, 1937, 1942).
	x			Texas (Bequaert, 1935, 1942; Eads, 1949; Bequaert, 1957).
		x		Texas (Van Volkenberg and Nicholson, 1943).
<u>Lipoptena odocoilei</u>	x			Louisiana (Byram, 1964).
<u>Lipoptena</u> sp.	x			Pennsylvania (Latham, 1955).
	x			Texas (Robinson, Kuttler, Thomas, and Marburger, 1967; Emerson, 1969).
	x			Washington (Hadlow, 1955).
		x		California (Clarke, 1913).
<u>Melophagus ovinus</u>	x			Oregon (Bequaert, 1957).
		x		Texas (Randolph and Eads, 1946).
* <u>Neolipoptena ferrisi</u> (<u>Lipoptena subulata</u> sensu Ferris and Cole, <u>Lipoptena</u> <u>ferrisi</u>)	x			British Columbia (Bequaert, 1937; Spencer, 1938, 1939; Bequaert, 1942; Cowan, 1946, 1951; Bequaert, 1957).
	x			California (Ferris and Cole, 1922; Bequaert, 1937, 1942; Linsdale and Tomich, 1953; Longhurst and Douglas, 1953; Bequaert, 1957; Taber and Dasmann, 1958).
	x			Montana (Bequaert, 1937, 1942, 1957; Senger and Capelle, 1959).
	x			Oregon (Bequaert, 1937, 1942, 1957).
	x			South Dakota (Bequaert, 1957).
	x			Washington (Bequaert, 1957).
	x			Wyoming (Bequaert, 1942; Honess and Winter, 1956).
		x		British Columbia (Cowan, 1951).

Table 1 Checklist of the Internal and External Parasites of Deer, Odocoileus hemionus and O. virginianus, in the United States and Canada -- Continued

PARASITES	HOSTS				GEOGRAPHIC DISTRIBUTION
	<u>Odocoileus</u> <u>hemionus</u>	<u>Odocoileus</u> <u>virginianus</u>		Deer	
<u>*Neolipoptena ferrisi</u> (Cont.)		x			California (Bequaert, 1937, 1942).
		x			Montana (Bequaert, 1937, 1942; Senger and Capelle, 1959).
		x			Oregon (Bequaert, 1942).
		x			South Dakota (Bequaert, 1957).
			x		California (Herman, 1945d).
			x		Idaho (USDA Par. Coll. 66091).
			x		Montana (Senger, 1963).
			x		Oregon (Bequaert, 1937).
<u>Oestrus ovis</u>		x			Wisconsin (Dahlberg and Guettinger, 1956).
<u>Phormia regina</u>	x				British Columbia (Cowan, 1946).
	x				California (Linsdale and Tomich, 1953).
			x		British Columbia (Cowan, 1951).
<u>Sarcophaga plinthopyga</u>	x				California (Linsdale and Tomich, 1953).
Lice					
<u>Cervicola forficula</u> (?, See text.)		x			Oklahoma (Emerson, 1940).
<u>Damalinia americana</u> (?, See text.)	x				Wyoming (Hones and Winter, 1956).
<u>Damalinia</u> sp. (?, See text.)			x		Colorado (Pillmore, 1961).
<u>Polyplax spinulosa</u>		x			Rhode Island (Mathewson and Hyland, 1962).
<u>Solenopotes binipilosus</u> (<u>Linognathus binipilosus</u> , <u>Cervophthirus binipilosus</u>)	x				Arizona (Swank, 1958).
		x			Arizona (Ferris and Stojanovich, 1951).
					Arizona (Nichol, 1938).
			x		Texas (Van Volkenberg and Nicholson, 1943; Ferris and Stojanovich, 1951).
<u>*Solenopotes ferrisi</u> (<u>Linognathus ferrisi</u> , <u>Cervophthirus ferrisi</u> , <u>Cervophthirus crassicornis</u>)	x				British Columbia (Cowan, 1946).
		x			California (Ferris, 1916b, 1916c, 1932; Ferris and Stojanovich, 1951; Holdenreid, Evans, and Longanecker, 1951; Linsdale and Tomich, 1953; Longhurst and Douglas, 1953; Taber and Dasmann, 1958).
			x		Minnesota (Fenstermacher, Olsen, and Pomeroy, 1943; Olsen and Fenstermacher, 1943; Scanlon, 1960).
			x		North Carolina (Ruff, [1938]; Schilling, 1938).
			x		Ontario (Scholten, Ronald, and McLean, 1962).
			x		British Columbia (Spencer, 1939).

Table 1. Checklist of the Internal and External Parasites of Deer, Odocoileus hemionus and O. virginianus, in the United States and Canada -- Continued

PARASITES	HOSTS				GEOGRAPHIC DISTRIBUTION
	<u>Odocoileus hemionus</u>	<u>Odocoileus virginianus</u>	Deer		
<u>*Solenopotes ferrisi</u> (Cont.)			x	Montana (Senger, 1959, 1963).	
			x	Pennsylvania (Peters, 1933).	
			x	Washington (USDA Par. Coll. 42937).	
<u>Trichodectes tibialis</u> (?, See text.)	x			British Columbia (Buckell, [1934]).	
	x			California (Kellogg and Ferris, 1915; Longhurst and Douglas, 1953; Taber and Dasmann, 1958; Browning and Lauppe, 1964).	
			x	Michigan (Whitlock, 1939).	
<u>Trichodectes</u> sp. (?, See text.)	x			Nebraska (Mohler, Wampole, and Fichter, 1951).	
<u>*Tricholipeurus lipeuroides</u> (<u>Trichodectes lipeuroides</u> , <u>Tricholipeurus virginianus</u> , <u>Damalinea lipeuroides</u> , <u>Cervicola lipeuroides</u> , <u>Cervicola virginianus</u>)	x			Alberta (Hopkins, 1960).	
	x			Arizona (Swank, 1958).	
	x			British Columbia (Spencer, 1939; Cowan, 1946; Hopkins, 1960).	
	x			Idaho (USNM Ent. Coll.).	
	x			Montana (USNM Ent. Coll.).	
	x			Oregon (USNM Ent. Coll.) (USDA Par. Coll. 41968, 41989).	
	x			Utah (Doman and Rasmussen, 1944).	
	x			Wyoming (Hones and Winter, 1956).	
	x			Arizona (K. C. Emerson Coll.).	
	x			Florida (USNM Ent. Coll.).	
	x			Idaho (USDA Par. Coll. 40288).	
	x			Maine (USNM Ent. Coll.).	
	x			Michigan (Lawrence, Hays, and Graham, 1965).	
	x			Minnesota (Fenstermacher, Olsen, and Pomeroy, 1943; Olsen and Fenstermacher, 1943).	
	x			Mississippi (USNM Ent. Coll.).	
	x			Montana (USNM Ent. Coll.).	
	x			New Jersey (K. C. Emerson Coll.).	
	x			New Mexico (USDA Par. Coll. 58971).	
	x			New York (Gerberg and Goble, 1941; Scanlon, 1960).	
	x			North Carolina (Ruff, [1938]; Schilling, 1938).	
	x			Oklahoma (Emerson, 1940).	
	x			Ontario (Scholten, Ronald, and McLean, 1962).	
	x			Pennsylvania (Peters, 1930), Philadelphia Zoo (Hope in Fox, 1936).	
	x			Quebec (Webster and Stewart, 1964).	

Table 1. Checklist of the Internal and External Parasites of Deer, Odocoileus hemionus and O. virginianus, in the United States and Canada -- Continued

PARASITES	HOSTS				GEOGRAPHIC DISTRIBUTION
	<u>Odocoileus hemionus</u>	<u>Odocoileus virginianus</u>	Deer		
* <u>Tricholipeurus lipeuroides</u> (Cont.)			x		South Carolina (USNM Ent. Coll.).
			x		Texas (Peters, 1930; Hightower, Lehman, and Eads, 1953).
			x		Washington (USNM Ent. Coll.).
			x		Arizona (Nichol, 1938).
			x		Colorado (USNM Ent. Coll.).
			x		Iowa (USDA Par. Coll. 43384).
			x		Maine (USDA Par. Coll. 41517, 41518).
			x		Montana (Senger, 1963).
			x		New Jersey (USNM Ent. Coll.) (USDA Par. Coll. 59029).
			x		New York (Bump, 1937).
			x		Pennsylvania (Peters, 1933).
			x		Texas (Van Volkenberg and Nicholson, 1943).
			x		Wisconsin (Rausch, 1950).
* <u>Tricholipeurus parallelus</u>			x		Alberta (Cowan, 1951).
(<u>Trichodectes parallelus</u> ,					
<u>Trichodectes odocoilei</u> ,			x		British Columbia (Spencer, 1939; Cowan, 1946, 1951; Hopkins, 1960).
<u>Cervicola odocoilei</u> ,					
<u>Damalinia parallelus</u>)			x		Colorado (USNM Ent. Coll.).
			x		Montana (USNM Ent. Coll.).
			x		Oregon (Shaw, Simms, and Muth, 1934).
			x		Utah (Doman and Rasmussen, 1944).
			x		Washington (USNM Ent. Coll.).
			x		Alberta (Cowan, 1951).
			x		Arizona (Beer, Cook, and Schwab, [1960]).
			x		British Columbia (Cowan, 1951).
			x		California (USNM Ent. Coll.).
			x		Georgia (K. C. Emerson Coll.).
			x		Massachusetts (K. C. Emerson Coll.) (USNM Ent. Coll.).
			x		Montana (McGregor, 1917).
			x		New Hampshire (USNM Ent. Coll.).
			x		New York (Scanlon, 1960).
			?		New York (Osborn, 1896 and Hopkins, 1960).
			x		North Carolina (Ruff, [1938]; Schilling, 1938).
			x		Nova Scotia (K. C. Emerson Coll.).
			x		Oklahoma (Emerson, 1940).

Table 1. Checklist of the Internal and External Parasites of Deer, Odocoileus hemionus and O. virginianus, In the United States and Canada -- Continued

PARASITES	HOSTS		GEOGRAPHIC DISTRIBUTION
	<u>Odocoileus</u> <u>hemionus</u>	<u>Odocoileus</u> <u>virginianus</u> Deer	
<u>*Tricholipeurus parallelus</u> (Cont.)	x		Pennsylvania (USNM Ent. Coll.).
	x		South Carolina (USNM Ent. Coll.).
	x		South Dakota (K. C. Emerson Coll.).
	x		Texas (USNM Ent. Coll.).
	x		Virginia (USNM Ent. Coll.).
		x	California (Clarke, 1913).
		x	Michigan (Paine, 1912; Kellogg and Ferris, 1915).
		x	Montana (Senger, 1963).
		x	Ontario (USNM Ent. Coll.).
		x	Oregon (Shaw, 1947).
		x	Pennsylvania (Peters, 1933).
		x	South Dakota (USDA Par. Coll. 59030).
<u>Tricholipeurus</u> sp.	x		British Columbia (Hopkins, 1960).
		x	New York (Cheatum, 1952).
		x	New York (Bump, 1940).
		x	Wyoming (Rush, [1932]).
Mites			
<u>Euschoengastia radfordi</u>	x		California (Brennan and Jones, 1954; Gould, 1956).
	x		Utah (Allred and Beck, 1966).
<u>Euschoengastia</u> sp.	x		California (Longhurst and Douglas, 1953).
<u>Neoschoengastia fullbergae</u>	x		California (Gould, 1956).
	x		Montana (Brennan, [1949]).
		x	Montana (Senger, 1963).
<u>Neoschoengastia</u> sp.	x		California (Longhurst and Douglas, 1953; Taber and Dasmann, 1958).
<u>Otodectes cynotis</u>		x	Alberta, Calgary Zoological Gardens (Sweatman, 1958).
<u>Otodectes</u> sp.		x	Wisconsin (Dahlberg and Guettinger, 1956).
<u>Odontacarus dentatus</u> (<u>Trombicula dentata</u>)		x	Texas (Ewing, 1925, 1931).
<u>Trombicula</u> (<u>Eutrombicula</u>) <u>alfreddugesi</u> (<u>Eutrombicula</u> <u>alfreddugesi</u>)	x		California (Dixon and Herman, 1945).
<u>Trombicula</u> (<u>Eutrombicula</u>) <u>splendens</u> (<u>Acariscus</u> <u>masoni</u>)		x	Florida (Ewing, 1943).

Table 1. Checklist of the Internal and External Parasites of Deer, Odocoileus hemionus and O. virginianus, in the United States and Canada -- Continued

PARASITES	HOSTS		GEOGRAPHIC DISTRIBUTION
	<u>Odocoileus hemionus</u>	<u>Odocoileus virginianus</u>	
		Deer	
Ticks			
* <u>Amblyomma americanum</u>	x		Georgia (Lund, Marshall, and Hayes, 1962).
	x		Illinois (Montgomery and Hawkins, 1967).
	x		Indiana (White, 1967).
	x		North Carolina (Tibbetts, 1953).
	x		Texas (Brennan, 1945a, 1945b; Randolph and Eads, 1946; Robinson, Kuttler, Thomas, and Marburger, 1967; Emerson, 1969).
	x		Virginia (Sonenshine, Lamb, and Anastos, 1965).
	x		Alabama (USDA Par. Coll. 43393).
	x		Florida (USDA Par. Coll. 34117).
	x		North Carolina (Carpenter, Chamberlain, and Peeples, 1946).
	x		South Carolina (Bishopp and Trembley, 1945).
	x		Texas (Van Volkenberg and Nicholson, 1943; Cooley and Kohls, 1944b).
<u>Amblyomma cajennense</u>	x		Texas (Eads, Menzies, and Hightower, 1956).
	x		Texas (Cooley and Kohls, 1944b).
<u>Amblyomma imitator</u>	x		?Texas (Kohls, 1958).
<u>Amblyomma inornatum</u>	x		Texas (Cook, Glazener, and Trainer, 1969).
* <u>Amblyomma maculatum</u>	x		Florida (Travis, 1941).
	x		Texas (Eads, Menzies, and Hightower, 1956).
	x		Florida (USDA Par. Coll. 34090, 34174, 34250, 42219, 44853).
	x		South Carolina (Bishopp and Trembley, 1945).
* <u>Boophilus annulatus</u>	x		Florida (Say, 1821).
	x		California (USDA Par. Coll. 15119, 15884).
	x		Florida (USDA Par. Coll. 31511).
	x		Texas (McIntosh, 1934).
* <u>Boophilus microplus</u> (<u>B. annulatus microplus</u> , <u>B. annulatus australis</u>)	x		Florida (Travis, 1941).
	x		Florida (McIntosh, 1934; Knapp, 1940).
	x		Texas (USDA Par. Coll. 40250).
* <u>Dermacentor albipictus</u> (<u>D. variegatus</u>) (See text.)	x		Alberta (Cowan, 1951).
	x		Arizona (Russo, 1956; Swank, 1958; Allen and Erling, 1964).
	x		British Columbia (Bruce, 1931; Hearle, 1938; Humphreys and Gibbons, 1942; Cowan, 1946, 1951; Gregson, 1956).

Table 1. Checklist of the Internal and External Parasites of Deer, Odocoileus hemionus and O. virginianus, in the United States and Canada -- Continued

PARASITES	HOSTS			GEOGRAPHIC DISTRIBUTION
	<u>Odocoileus</u> <u>hemionus</u>	<u>Odocoileus</u> <u>virginianus</u>	Deer	
* <u>Dermacentor albipictus</u> (Cont.)	x			California (Holdenreid, Evans, and Longanecker, 1951; Linsdale and Tomich, 1953).
	x			Montana (Birdseye in Henshaw and Birdseye, 1911; Bishopp and Wood, 1913).
	x			Nevada (Brinton and Kohls, 1963).
	x			Oregon (Chamberlin, 1937).
	x			Texas (Eads, Menzies, and Hightower, 1956).
	x			Utah (Doman and Rasmussen, 1944; Coffey, 1954; Richens, 1967).
	x			Washington (USDA Par. Coll. 44895).
	x			Wyoming (Hones and Winter, 1956).
		x		Georgia (Pratt and McCauley, 1948).
		x		Idaho (USDA Par. Coll. 40287).
		x		Michigan (Lawrence, Hays, and Graham, 1965).
		x		Minnesota (Fenstermacher and Jellison, 1933; Fenstermacher, Olsen, and Pomeroy, 1943; Olsen and Fenstermacher, 1943).
		x		New Mexico (Cooley, 1938).
		x		Oklahoma (Ellis, 1955).
		x		Ontario (Anderson, 1962).
		x		Rhode Island (Hyland and Mathewson, 1961).
		x		Texas (Eads, Menzies, and Hightower, 1956).
		x		Virginia (Sonenshine, Lamb, and Anastos, 1965).
		x		Wisconsin (Knipping, Morgan, and Dicke, 1950).
			x	Alberta (Gregson, 1956).
			x	British Columbia (MacNay, 1952; Gregson, 1956).
			x	Colorado (Pillmore, 1961).
			x	Montana (Senger, 1959, 1963).
			x	New Mexico (USDA Par. Coll. 31564, 42922).
			x	New York (USDA Par. Coll. 18563).
			x	Ontario (Gregson, 1956).
			x	Oregon (Shaw, 1947).
			x	South Carolina (Carpenter, Chamberlain, and Peeples, 1946).
			x	Texas (Van Volkenberg and Nicholson, 1943; Brennan, 1945b).
			x	Utah (Edmunds, 1951).
			x	Washington (Neumann, 1897).

Table 1. Checklist of the Internal and External Parasites of Deer, Odocoileus hemionus and O. virginianus, in the United States and Canada -- Continued

PARASITES	HOSTS			GEOGRAPHIC DISTRIBUTION
	<u>Odocoileus hemionus</u>	<u>Odocoileus virginianus</u>	Deer	
* <u>Dermacentor albipictus</u> (Cont.)			x	Wyoming (Rush, [1932]).
<u>Dermacentor erraticus</u> typical (?, See text.)			x	Massachusetts (Bequaert, 1946).
			x	New York (Bequaert, 1946).
			x	Pennsylvania (Bequaert, 1946).
<u>Dermacentor erraticus</u> var. <u>albipictus</u> (?, See text.)			x	Nova Scotia (Bequaert, 1946).
* <u>Dermacentor hunteri</u>	x			Arizona (Russo, 1956; Swank, 1958; Allen and Erling, 1964).
	x			Nevada (Brinton and Kohls, 1963).
* <u>Dermacentor nigrolineatus</u> (See text.)	x			Texas (USDA Par. Coll. 59298).
		x		Arizona (USDA Par. Coll. 40279).
		x		New Mexico (USDA Par. Coll. 55699).
		x		New York (Packard, 1869).
		x		Texas (Banks, 1908; Bishopp and Wood, 1913).
		x		Arizona (Nichol, 1938).
		x		Florida (USDA Par. Coll. 56080).
		x		New York (Banks, 1908; Stiles, 1910).
		x		Oklahoma (USDA Par. Coll. 28637).
		x		Pennsylvania (Peters, 1933).
		x		Rhode Island (McIntosh and McDuffie, [1957]).
		x		Texas (Stiles, 1910).
		x		Wisconsin (Banks, 1908; Stiles, 1910).
<u>Dermacentor nitens</u> (<u>Anocentor nitens</u>)		x		Texas (Eads, Menzies, and Hightower, 1956).
		x		Florida (Strickland and Gerrish, 1964).
* <u>Dermacentor occidentalis</u>	x			California (Boynton and Woods, 1933; Dixon, 1934; Boynton and Woods, 1940; Dixon and Herman, 1945; Holdenreid, Evans, and Longanecker, 1951; Linsdale and Tomich, 1953; Longhurst and Douglas, 1953; Taber and Dasmann, 1958; Osebold, Douglas, and Christensen, 1962; Browning and Lauppe, 1964; Brunetti, 1965).
			x	California (Marx in Curtice, 1892; Banks, 1908; Stiles, 1910; Clarke, 1913; Cox, Jahraus, and Moore, 1921).
<u>Dermacentor parumapertus</u>	x			California (Boynton and Woods, 1933).
* <u>Dermacentor variabilis</u>		x		Illinois (Montgomery and Hawkins, 1967; Montgomery, 1968).
			x	Florida (USDA Par. Coll. 44852).
			x	New York (Bump, 1937).
* <u>Dermacentor venustus</u> (<u>D. andersoni</u>)	x			Alberta (Cowan, 1951).
		x		British Columbia (Hearle, 1938; Cowan, 1951).

Table 1. Checklist of the Internal and External Parasites of Deer, Odocoileus hemionus and O. virginianus, in the United States and Canada -- Continued

PARASITES	HOSTS				GEOGRAPHIC DISTRIBUTION
	<u>Odocoileus</u> <u>hemionus</u>	<u>Odocoileus</u> <u>virginianus</u>	Deer		
<u>*Dermacentor venustus</u> (Cont.)	x				Canada (Gregson, 1956).
	x				Colorado (Cooley, 1938).
	x				Oregon (Chamberlin, 1937).
	x				Utah (Coffey, 1954).
	x				Wyoming (Hones and Winter, 1956).
		x			Alberta (Cowan, 1951).
		x			British Columbia (Cowan, 1951).
			x		Idaho (USDA Par. Coll. 32417).
			x		Montana (Senger, 1963).
<u>Dermacentor</u> sp.	x				Alaska (Klein, 1965).
<u>Haemaphysalis leporispalustris</u>		x			Ontario (Scholten, Ronald, and McLean, 1962).
			x		Texas (Brennan, 1945b).
<u>*Ixodes affinis</u>		x			Georgia (Lund, Marshall, and Hayes, 1962).
		x			South Carolina (Gerrish and Ossorio, 1965).
<u>Ixodes dentatus</u>		x			Rhode Island (Hyland and Mathewson, 1961).
<u>Ixodes muris</u>		x			New York (Anastos, 1947; Collins, Nardy, and Glasgow, 1949).
<u>Ixodes ozarkus</u>			x		Arkansas (Cooley, 1944; Cooley and Kohls, 1945).
<u>Ixodes pacificus</u> (<u>I. californicus</u> , <u>I. californicus pacificus</u> , <u>I. ricinus californicus</u> , <u>I. ricinus</u> sensu Hearle)	x				British Columbia (Hearle, 1938 [see Gregson, 1956]; Cowan, 1946).
		x			California (Banks, 1908; Boynton and Woods, 1933; Holdenreid, Evans, and Longanecker, 1951; Linsdale and Tomich, 1953; Longhurst and Douglas, 1953; Taber and Dasmann, 1958; Osebold, Douglas, and Christensen, 1962; Browning and Lauppe, 1964; Brunetti, 1965).
		x			Canada (Gregson, 1956).
		x			Oregon (Kohls and Cooley, 1937).
		x			Utah (Beck, 1955).
			x		British Columbia (Cowan, 1951).
			x		California (Clarke, 1913; Cox, Jahraus, and Moore, 1921).
			x		Oregon (Shaw, 1947).
<u>*Ixodes scapularis</u> (<u>I. ricinus</u> var. <u>scapularis</u>)		x			Florida (Travis, 1941; Moore, 1957).
		x			Georgia (Pratt and McCauley, 1948; Lund, Marshall, and Hayes, 1962).
		x			Massachusetts (Bequaert, 1946).
		x			Rhode Island (Hyland and Mathewson, 1961).
		x			Texas (Randolph and Eads, 1946).

Table 1. Checklist of the Internal and External Parasites of Deer, Odocoileus hemionus and O. virginianus, in the United States and Canada -- Continued

PARASITES	HOSTS		GEOGRAPHIC DISTRIBUTION
	<u>Odocoileus hemionus</u>	<u>Odocoileus virginianus</u> Deer	
<u>*Ixodes scapularis</u> (Cont.)	x		Virginia (Sonenshine, Lamb, and Anastos, 1965).
		x	Alabama (USDA Par. Coll. 18310, 43392).
		x	Arkansas (Cooley and Kohls, 1945; Tugwell and Lancaster, 1962).
		x	North Carolina (USDA Par. Coll. 40885).
		x	South Carolina (Carpenter, Chamberlain, and Peeples, 1946).
		x	Texas (Brennan, 1945b; Cooley and Kohls, 1945; Eads, Menzies, and Hightower, 1956).
<u>Ornithodoros coriaceus</u>	x		California (Cooley and Kohls, 1944a; Holdenreid, Evans, and Longanecker, 1951; Linsdale and Tomich, 1953; Taber and Dasmann, 1958).
<u>Ornithodoros hermsi</u>	x		California (Longhurst and Douglas, 1953).
<u>*Otobius megnini</u> (<u>Ornithodoros megnini</u>)	x		Arizona (Cooley and Kohls, 1944a).
	x		British Columbia (Cowan, 1951; Gregson, 1956; Rich, 1957).
	x		California (Hooker, Bishopp, and Wood, 1912).
	x		Montana (Cooley and Kohls, 1944a).
	x		Texas (Eads, Menzies, and Hightower, 1956).
	x		Wyoming (Hones and Winter, 1956).
	x		British Columbia (Cowan, 1951; Rich, 1957).
	x		Montana (Cooley and Kohls, 1944a).
	x		New Mexico (USDA Par. Coll. 56200).
		x	Arizona (Cooley and Kohls, 1944a).
		x	British Columbia (MacNay, 1952; Gregson, 1953; MacNay, 1958).
		x	Idaho (Cooley and Kohls, 1944a).
		x	Montana (Cooley and Kohls, 1944a; Senger, 1959, 1963).
		x	Oregon (Shaw, 1947).
		x	Texas (Cooley and Kohls, 1944a; Brennan, 1945b).
		x	Utah (Edmunds, 1951).
<u>*Rhipicephalus sanguineus</u>	x		Florida (USDA Par. Coll. 42965, 44111).
		x	Texas (Cooley, 1946).

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